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SMART ROBOT TO AVOID THE SPREAD OF COVID

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ABSTRACT

Now a days its mandatory to wear mask where ever we go and we see watchmen everywhere who checks our temperature and ensures that we wear mask. But it is not possible that the watchmen is accurate every time and it's difficult to maintain watchmen and it's a bit expensive. To overcome this problem, we came up with a solution that is the Robot. This Robot is a smart robot which detects whether the person wearing mask or not using a camera and body temperature using MLX90614 temperature sensor. It also has an automatic sanitizer ejector and a gate connected to a stepper motor. Whenever a person comes in front of ultrasonic sensor the camera captures the face and detects whether the person is wearing mask or not and next the body temperature is measured using temperature sensor. If the person wore mask and has body temperature below 100F then the gate is opened and sanitizer is ejected, else gate is not opened.

I. INTRODUCTION

In this proposed project Smart Robot to avoid the spread of Covid, we have designed and developed a working model of a smart robot which detects whether the person is wearing mask or not. Now a days due to covid it is mandatory to wear mask. This robot is interfaced with gate. Whenever the person wears a mask, the gate automatically opens. The system not only detects the mask but also detects the body temperature of the person and has an automatic sanitizer. Whenever the person wears a mask and has a normal body temperature then the gate will be opened. This system can be used in schools, colleges, offices, malls etc.,

II. METHODOLOGY

The block diagram of the prototype is shown below. The input is taken from three sensors and the output is given to three blocks. The inputs are taken from camera module, MLX90614 Infrared Temperature sensor and IR Sensor. The inputs from the sensors is given to an processor, the processor we use is an Raspberry PI 3 Version B. The outputs are interfaced with raspberry pi

Hardware components used

1. Raspberry PI 3 version B – it is used as a processor
2. 5MP PI Camera – used to capture the face
3. MLX90614 Temperature Sensor – used to detect the boy temperature
4. IR Sensor – used to detect the person and turn on the sanitizer pump
5. Servo motor – it is used as a gate
6. Sanitizer pump – it is used as a sanitizer dispenser
7. Buzzer – it turns on when person doesn't wear mask or his body temperature is high
8. Power supply – here we use 9V batteries to run the processor and other sensors
9. 16 X 2 LCD Display – it is used to display messages

The block diagram is shown below

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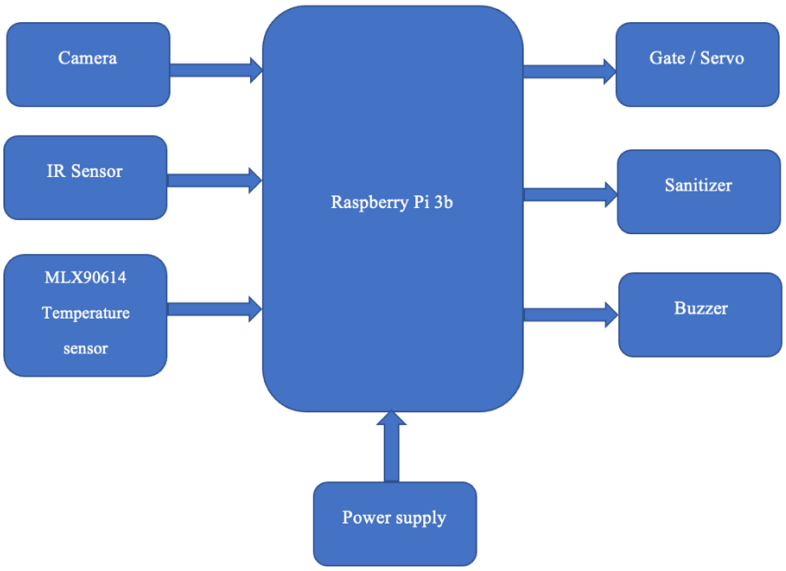

Figure: Block Diagram

III. MODELING AND ANALYSIS

The main modeling concepts used in this project are

1. Deep learning
2. OpenCV
3. TensorFlow
4. Keras

Deep learning

Deep learning approaches are intended to learn hierarchies of characteristics which consist of lower-level characteristics with higher hierarchies Auto-learning features at different abstract levels permit a computer to learn complex functions that map the input directly to the output without relying on human- designed properties Large learning algorithms appear, on several occasions, to use the unknown essence of the input distribution to distinguish good representations. The hierarchy of concepts enables the machine to learn complex concepts through simpler concepts. The map is depth and consists of several layers if we draw a graph that shows how these definitions have been built up on each other This is why we call AI deep learning this technique. The input (and also output) are analogic in deep learning in problem areas. This means that they are not just a few tables, but pixel data images, text recordings or audio recordings. They are even tables. Deep learning makes it possible to learn data representation with various degrees of complexity through computer models consisting of several computing layer models.

OpenCV

open access machine vision and instruction applications library (Open Source Computer Vision Library). OpenCV has been developed for a popular computer vision infrastructure and for rapid use in consumer products of machine perception. As a BSD-licensed software, OpenCV encourages the use and alteration of the code by enterprises. The library has more than 2,500 integrated algorithms that include both traditional and advanced computer vision and machine learning algorithms. These algorithms can serve for detecting and recognising images, for identifying objects, classifying human activity in images, for tracking camera movements, for tracking moving objects, for extracting objects' 3D models, to create stereo camera-based 3D point clouds, to generate pictures in high resolution of the entire scene. OpenCV has over 47,000 user group members and is estimated to have over 18 million downloads. In businesses, consulting associations and government agencies, the library is widely used. In addition to existing library-employed companies such as Google,Yahoo,Microsoft,Intel,IBM,Sony,Honda,Toyota, several startups are now working with OpenCV, such as Applied Minds, Video Surf, and Zeitera. OpenCV's use includes the following areas: gathering street views, detecting intrusions into Israel's camera surveillance, monitoring China's mining machines, allowing robots to manoeuvre and gather items at Weillow Garage, detecting pool drownings in Europe, running in Spain and

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New-York interactive art, monitoring debris runways in Turkey, checking pro labels in the field of traffic. It supports Linux, Windows, Mac OS and Android, and has Java, Python,C++ and MATLAB interfaces. The OpenCV uses MMX and SSE instructions where available, mostly in real time vision applications. Right now there are actively built a fully-fledged CUDA and OpenCV interfaces. There are more than 500 algorithms and about ten times the number of algorithm functions. OpenCV is native to C++ and contains an interface template with STL containers which works seamlessly.

TENSORFLOW

TensorFlow is an open source free data flow software library and a differentiable programming library that can cover a number of tasks. It is a symbolic math library that is also used by apps like neural networks. TensorFlow is Google Brain's second-generation framework, for analysis and development on Google. On February 11, version 1.0.0 was released, TensorFlow can operate on several CPUs and GPUs (with optional CUDA and SYCL extensions on graphical units for general purpose computing), while the Reference Code is running on individual computers.

TensorFlow is usable on 64-bit Linux, MacOS, Windows and handheld devices, such as iOS and Android. Its modular architecture facilitates the fast deployment of computing systems from desktops and server clusters to handheld and edge computers, on a range of platforms (CPUs, GPUs and TPUs).The term Tensor Flow derives from activity in multidimensional data arrays known as tensors conducted by neural networks. On a Google I/O conference in June 2016, Jeff Dean reported on TensorFlow, which included only five Google repositories, to 1,500 GitHub repositories. Unlike other numerical libraries planned to be used in the field of deep learning such As Theano, TensorFlow was designed for use in research and development as well as in manufacturing systems. It can run on a single CPU, GPU and mobile devices, and on hundreds of large-scale distributed systems.

KERAS

Keras is an API for people, not robots. Keras is compatible with basic APIs, minimises the amount of user actions needed for typical uses, delivers transparent and operative error messages and uses best practises to reduce cognisant load. It also contains detailed materials and developer guides. Included in Keras are numerous implementations of widely-used neural network building blocks such as layers, targets, activation functions, optimizers and several methods for easy code writing using image and text data for the depth of neural network code. Code is stored in GitHub and the GitHub issue page is used in help forums, as is a Slack Channel. Keras is a minimalist, deep learning Python library that can be used on top of Theano or Tensor Flow. It was designed to allow research and development to adopt profound models as quickly as easily as possible. It is available on Python 2.7 or 3.5 and can run smoothly with the underlying frames on GPUs and CP Users. It is published in the MIT permit.

Working

A portable, lightweight camera that supports Raspberry Pi may be the Pi Camera module. The MIPI camera serial interface protocol communicates with the Pi victimisation. It is unusually used in image process, machine learning or in police inquiry. The police investigation drones are commonly used because camera payloads are relatively low.The area units used with PC may even be used with the exception of such modules, Pi uses conventional USB webcams. We have to tackle the Pi to change the Camera while we interface the hardware. To open the setup window, use the command "sudoraspi- config." Then change the camera under interfacing options. Restore the Pi and your module for the camera is ready to be used. You will then make the Pi for photographs or video recording. Easy python scripts victimization and using the above concepts it detects whether the person wearing the mask or not. If person not wearing the mask then the buzzer will be turned on and gate will not be opened. If mask is detected then the body temperature of the person is detected using MLX90614 Temperature sensor. If the temperature is normal then sanitizer is dispensed and gate is opened. If the temperature is high then gate will not be opened. It is completely an automatic system

IV. RESULTS AND DISCUSSION

The circuit when implemented it detected face mask and body temperature accurately. In some situations there is some delay and frame drop due to system heat and loose contacts which doesn't effect the normal working in any way but it just create a delay of microseconds in detection which is very small.

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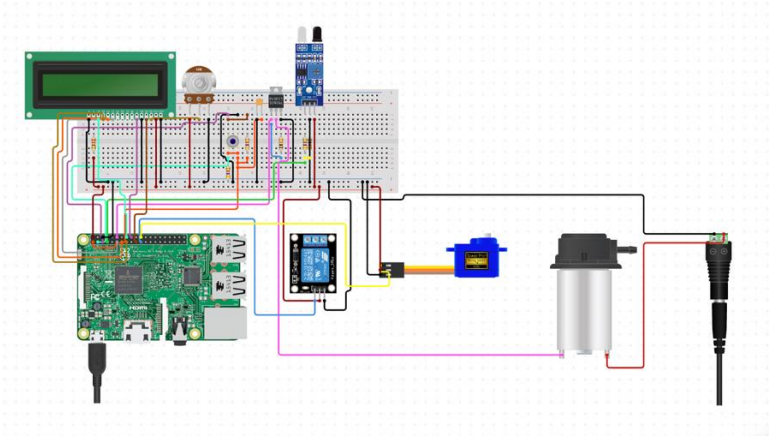

Figure: Circuit Diagram

Figure: Final Result

Advantages

1. It can identify multiple faces in a real time video recording
2. It is very accurate and fast
3. It is completely automatic
4. Reduces the usage of manpower
5. It consumes very low power
6. It is a portable device

Disadvantages

1. Hardware complexity
2. Overheating

V. CONCLUSION

The project SMART ROBOT TO AVOID THE SPREAD OF COVID-19 has been successfully designed and tested. It works completely fine an detects face mask with an accuracy of 99.78% in any conditions.

In COVID situations, the current scenarios and the increase are an unsettling situation. The mandate of carrying a mask must be checked every time and every time out of home by all establishments/offices. The use of technology would not only automate the detection task but avoid the reversing of considerable work force by manually checking defaulters rather than manual checks.

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